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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/723,150  
Filing Date: November 26, 2003  
Appellant(s): KUMAR ET AL.

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Joseph B. Ryan  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 5/05/08 appealing from the Office action mailed 12/04/07.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

2002/0085560	CATHEY	7-2002
2003/0188198	HOLDSWORTH	10-2003
2003/0005146	MILLER	1-2003
6,651,096	GAI	11-2003

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

**Claims 1, 3-9, 11, 12, 15, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cathey US 2002/0085560 in view of Holdsworth US 2003/0188198**

As per claim 1, Cathey teaches determining a plurality of rules (packet classification), each of at least a subset of the rules having a plurality of fields (extracted fields of header data) and a corresponding action (identify application programs to execute); and processing the rules to generate a multi-level tree representation (classification logic is configured as a decision tree), (Fig 5B, [0052], [0061], [0063]).

Cathey teaches each of one or more of the levels of the tree representation being associated with a corresponding one of the fields (level one associated with source address, level two associate with destination address) [0063]. Cathey teaches at least one level of the tree representation other than a root level of the tree representation comprises a plurality of nodes (Header Check 2, Fig 5B, [0063], Cathey teaches at least two of the nodes at that level each comparing header data associated therewith (header check 2 checks Internet Protocol Destination Address and compares to predefined data, and address tables),([0063], [0067], [0078]).

Cathey fails to teach access control lists or explicitly state separate matching tables.

Holdsworth teaches access control lists and separate matching tables (each node may have its own acl) [0048].

It would have been obvious to one of ordinary skill in the art to use the ACL of Holdsworth with the decision levels and fields of Cathey because it allows security and access control to be performed to enhance network safety.

As per claim 3, Cathey teaches the plurality of fields comprises at least first and second fields, the first field comprising a source address field and the second field comprising a destination address field [0063].

As per claim 4, Cathey teaches a final level of the tree representation comprises a plurality of leaf nodes (packet classification), each associated with one of the actions (choosing an application) of the plurality of rules (Fig 5B, [0063], [0083]).

As per claim 5, Cathey teaches the root level of the tree representation includes a plurality of field values, each corresponding to a distinct source address in a first field of the plurality of rules (header check 1 at the root may include a source address, compared to predefined source address table, ([0063] [0076]).

As per claim 6, Cathey teaches a second level of the tree representation includes a plurality of nodes, each being associated with a subtree of a given one of the distinct source addresses of the root level of the tree (Fig 5B, [0063]).

As per claim 7, Cathey teaches a given one of the second level subtrees identifies one or more destination addresses to be examined if the corresponding root level source address matches a source

address of a given received packet. (header check 2 at the node may include a destination address, (Fig 5B [0063]).

As per claim 8, Holdsworth teaches a matching table at a given level of the tree representation other than a root level of the tree representation comprises at least a portion of a subtree identified by a particular field value from an immediately previous level (nodes may inherit parent ACL lists) [0058].

As per claim 9, Cathey teaches the tree representation is generated by associating a first node at the root level with a given value in a first field (source address) of one of the plurality of rules (packet classification), and then processing remaining field values (destination address) sequentially, with each value in turn being compared to one or more existing values (predetermined information) at the appropriate node(s) of the tree representation to determine if a match exists, and associating that value with a matching table (address table) at one of the nodes of the tree representation based at least in part on the determination (Fig 5B, [0063], [0067], [0078].

As per claim 11. Holdsworth teaches the corresponding actions include at least an accept action and a deny action (allow, deny) [0051].

As per claim 12, Cathey teaches the step of storing at least a portion of the tree representation in memory circuitry accessible to the processor (stored in IRAM connected to packet classification engine) [0030].

As per claims 15, and 20 Cathey teaches a processor having memory circuitry associated therewith; the memory circuitry being configured for storing at least a portion of a multi-level tree representation (stored in IRAM connected to packet classification engine) [0030].

Cathey teaches each of one or more of the levels of the tree representation being associated with a corresponding one of the fields; (extracted fields of header data). Cathey teaches the processor being operative to utilize the stored tree representation to perform a function (classify) [0030]. Cathey teaches at least one level of the tree representation other than a root level of the tree representation comprises a plurality of nodes, (Header Check 2, Fig 5B, [0063] Cathey teaches at least two of the nodes at that level each having a separate matching table associated therewith (header check 2 checks Internet Protocol Destination Address and compares to predefined data, and address tables),([0063], [0067], [0078]).

Cathey fails to teach access control lists or explicitly state separate matching tables.

Holdsworth teaches access control lists and separate matching tables (each node may have its own acl) [0048].

It would have been obvious to one of ordinary skill in the art to use the ACL of Holdsworth with the decision levels and fields of Cathey because it allows security and access control to be performed to enhance network safety.

As per claim 17. Cathey teaches the memory may be integrated with the classification engine on a controller [0040].

**Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cathey US 2002/0085560 in view of Holdsworth US 2003/0188198 in view of Miller US 2003/0005146**

As per claim 2, the previous Cathey-Holdsworth combination does not teach longest prefix matching. Miller teaches using the longest prefix matching (LPM) method, [0031].

It would have been obvious to one of ordinary skill in the art to use the LPM method of miller with the system of Cathey-Holdsworth to improve matching efficiency, [0015].

**Claims 10, 13, 14, 16, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cathey US 2002/0085560 in view of Holdsworth US 2003/0188198 in view of Gai US 6,651,096.**

As per As per claim 10, the previous Cathey-Holdsworth combination does not teach each of at least a subset of the nodes of the tree representation having values in the matching table are arranged in order of decreasing specificity.

Gai teaches each of at least a subset of the nodes of the tree representation having a separate matching table associated therewith, values in the matching table are arranged in order of decreasing specificity (wildcards increase down the list) (Fig 5A Source Address).

It would have been obvious to one of ordinary skill in the art to use the list of Gai with the system of Cathey-Holdsworth in order to filter in order of desire.

As per claim 13, the previous Cathey-Holdsworth combination does not teach the hardware and CPU used in implementing an ACL.

Gai teaches the step of utilizing the stored tree representation to perform an access control list based function in the processor (teaches using ACL stored in CAM with CPU) (Col 4 lines 10-25).

It would have been obvious to one of ordinary skill in the art to use the hardware of Gai with the system of Cathey-Holdsworth because a CPU is necessary to implement software.



As per claim 14, Gai teaches the access control list based function comprises packet filtering (receipt and action for packet) (Col 4 lines 30-36).

As per claim 16, Gai teaches the access control list based function comprises packet filtering (receipt and action for packet) (Col 4 lines 30-36).

As per claim 18, Gai teaches the processor comprises a network processor (intermediate network device CPU) (Col 4 lines 7-10).

As per claim 19, Gai teaches the processor comprises an integrated circuit (CPU) (Col 4 lines 7-10).

#### **(10) Response to Argument**

##### **As per claims 1, 3-5, 8, 11, 12, 15, 17, and 20,**

Appellant argues that the collective teachings of Cathey and Holdsworth do not meet the limitations as taught in claim 1. Appellant argues that Holdsworth does not teach or suggest a multilevel tree representation of an ACL because Holdsworth discloses each message topic in a tree corresponds to a different topic with an associated ACL. Appellant asserts that Holdsworth does not teach a multilevel tree ACL, but uses a separate ACL for each node of message topics. Appellant rejects the examiners previous argument that Holdsworth is not relied of for an ACL tree but only for ACL's and matching tables.

Examiner contends that first, as stated in the previous rejections, Cathey is the reference relied upon for the multilevel tree representation of an ACL (Figure 5B). Cathey does not explicitly state "ACL" or "matching table" so Holdsworth has been paired with Cathey to explicitly teach said ACL, and matching table. However, alternately, Holdsworth does teach that the Access Control Lists are multi-level associated by subject.

Holdsworth teaches a tree structure with multiple nodes and separate matching tables. Holdsworth teaches that the ACL's may have a hierarchy, where the child node inherits the properties of the parent ACL [0048], [0051], [0058]. Thus Holdsworth teaches a multilevel tree access control list. When one travels down the tree by subject each individual ACL contributes to an overall access control structure, and thus Holdsworth meets the claim limitations of claim 1.

Appellant argues that the ACL of Holdsworth is incompatible with the packet processor of Cathey because the decision tree of Cathey forms a single ACL. Appellanat argues that with reference to Figure 5B that Cathey only has a single branching at each node, and thus none of the nodes have separate matching tables.

Examiner counters that Cathey does not explicitly teach "matching tables" but does compare header information to prestored information [0067], [0073], [0078]. Examiner is unclear how Cathey is not compatible with Holdsworth because both teach comparing data at each branch. Both Cathey and Holdsworth have a "plurality of nodes" that is not at the root node. Figure 5B shows 352, and 354, which are comparing information. Holdsworth is relied on for the "separate matching tables". Cathey merely teaches that each branch compares information in order to classify a packet.

Appellant argues that the motivational statement to combine Cathey and Holdsworth is not sufficient, and one of ordinary skill in the art would not look to combine the references.

The examiner disagrees that one of ordinary skill in the art would not look to combine Cathey and Holdsworth. Both references are of the art of network security, Cathey is packet filtering, and Holdsworth in Access Control. It would have been obvious for one of ordinary skill to use the header information decision

tree of Cathey and the ACL of Holdsworth. The combination allows the decision tree to safely classify packets by comparing incoming packets with ACL data.

**As per claim 6,**

As per claim 6, Appellant argues Cathey figure 5B does not disclose a node associate with a subtree given on of a number of source addresses as stated in claim 6.

Examiner points to Cathey figure 5B and has interpreted the claim in the broadest reasonable manner. The second level (352) of Figure 5B is "associated" (connected to) a subtree (354) of a given one of a distinct source of the root level (source checked at 350, decision made). After the source address is checked at 350, that particular distinct address is classified according to the decision logic of the invention and sorted down to the subtree [0063].

**As per claim 7**

As per claim 7, Appellant argues that Cathey figure 5B does not show a given subtree and claim 7 as stated.

Examiner again points to Cathey figure 5B. The second level (352) examines, or identifies destination addresses in the header that are matched to prestored data [0063]. Any data that makes it to one branch of the second level has already been sorted from a source address in level one.

**As per claim 9,**

As per claim 9, Appellant argues that Cathey does not teach how the decision tree is generated or using the tree for sequential processing of values with matching tables [0030].

Examiner points to Cathey and Holdsworth. Cathey generates the decision tree based on packed classification logic and rules, using a packet classification engine [0030]. After the packet enters the tree it is classified by source and destination, sequentially down the tree until it is ultimately classified. Holdsworth provides the teaching of matching tables for the levels of Cathey as previously argued, thus the ACL tree is generated.

**As per claim 2,**

As per claim 2, Appellant argue as stated in previous arguments with regards to claim 1, that Cathey and Holdsworth fail to teach at least two nodes with matching tables and thus cannot teach longest prefix matching tables. Appellant asserts that Miller also fails to meet claim 2's limitations.

Examiner has argued previously with regard to claim 1, that Cathey and Holdsworth do teach a plurality of nodes with separate matching tables. Miller is relied upon to implement a longest prefix matching.

**As per claim 10,**

As per claim 10, Appellant asserts that the claim limitations are not met because the source field is the root node of Cathey. Appellant argues that Gai's teaching of decreasing wildcards relate to a source address, and the root node, but claim 10 relates to non-root levels, thus the combination does not meet the limitations of claim 10.

Examiner does not rely on Gai to teach a source address, as the appellant argues but that matching tables are arranged in order of decreasing specificity. Gai does illustrate such a table as a source address table, however, the examiner is using the principle of sorting as taught by Gai, and not the actual source address. Gai does not relate to a root node of Cathey, as the applicant asserts.

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**As per claims 13, 14, 18, and 19**

Appellant asserts that claims 13, 14, 18, and 19 are allowable based on the arguments previously stated above.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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